Agriculture
Canada

Research Branch
Direction générale de la recherche

Technical Bulletin 1987-4E

Highlights of research in sheep production in western Canada during the last thirty years

Canada

Highlights of research in sheep production in western Canada during the last thirty years

J.A. VESELY
Research Station
Agriculture Canada
Lethbridge, Alberta

Technical Bulletin 1987-4E
Lethbridge Research Station Contribution No. 11

Research Branch
Agriculture Canada
1987

Copies of this publication are available from
Animal Science Section
Research Station
Research Branch, Agriculture Canada
P.O. Box 3000, Main
Lethbridge, Alberta
T1J 4B1

Produced by Research Program Service

© Minister of Supply and Services Canada 1987
Cat. No. 054-8/1987-4E
ISBN 0-662-15323-5

cover

The dots on the map represent Agriculture Canada research establishments.

CONTENTS

SUMMARY/RÉSUMÉ 1

INTRODUCTION 1

1. EVALUATION OF BREEDS 2

2. SELECTION FOR WEIGHT-PER-DAY-OF-AGE 7

3. CROSSBREEDING IN SHEEP 10

4. ASSESSMENT OF LIFETIME PRODUCTIVITY 19

5. USEFULNESS OF FINNISH LANDRACE AND DORSET HORN BREEDS 22

6. YEAR-ROUND BREEDING CONTROLLED BY LIGHT 26

7. IMPORTATION OF THE ROMANOV BREED 36

8. VARIOUS RELATED SUBJECTS 39

SUMMARY

There are several ways in which sheep production can be improved: by the proper choice of a breed for a particular environment, by selection within the breed, and by crossbreeding with various breeds. Of course, the achievement of breeding goals goes hand in hand with management, which is an important factor in livestock production. Research in sheep production in Western Canada during the last 30 years has followed this pattern. Thus, the results presented here give the reader information on performance in the production of eleven breeds that were either native to this region or were brought in as "exotics". The results of a selection experiment, included in this report, demonstrate the gains a breeder can achieve with consistent and unaltered selection pressure on weight per day of age. Striking and substantial gains of up to 50% in kilograms of lamb produced were obtained in crossbreeding experiments and even greater variation in reproduction traits (number of lambs born to ewes lambing) due to crossbreeding was obtained. The Finnish Landrace and Romanov breeds of sheep were singled out as useful breeds, particularly in crossbreeding plans. During the course of the research, management has been proven to be an important tool in a successful operation. The procedure of inducing year-round breeding by artificially controlling the day length is described here. Other useful results on subjects such as mastitis, mortality of lambs, vaccination against enterotoxemia, meat flavor and confinement of sheep are presented.

RÉSUMÉ

Il existe plusieurs façons d'améliorer la production ovine : en choisissant judicieusement la race en fonction du milieu, en adoptant la sélection intra-race et en procédant par croisements. Il va de soi que la réalisation des objectifs de sélection ne peut se dissocier des méthodes de conduite, lesquelles constituent un facteur important de l'élevage, et c'est l'orientation adoptée par la recherche ovine dans l'ouest du Canada au cours des 30 dernières années. Les résultats présentés ici renseignent donc le lecteur sur le rendement de onze races qui sont indigènes à la région ou d'origine étrangère plus récente (races dites exotiques). Les résultats d'une expérience de sélection, expliqués dans le présent rapport, mettent en évidence les gains que l'éleveur peut escompter en ne déviant pas du processus de sélection axé sur le poids par jour d'âge. Des gains substantiels, pouvant atteindre l'ordre de 50 % en poids d'agneau produit, ont été réalisés dans des essais de croisement et on a obtenu aussi une variation encore plus forte des caractères de reproduction (nombre d'agneaux nés par agnelage) attribuable au croisement. La Finnoise et la Romanov se sont révélées des races utiles, en particulier dans les protocoles de croisement. Au fil des recherches, les pratiques de conduite ont démontré toute leur importance pour le succès de l'exploitation. L'induction de la reproduction à contre-saison en manipulant artificiellement le régime d'éclairement fait l'objet d'un chapitre spécial. Le rapport fait également état d'autres résultats intéressants, notamment sur la mammite, la mortalité en bas âge, la vaccination contre l'entérotoxémie, le goût de la viande et l'élevage en claustration.

INTRODUCTION

During the last 30 years (1956-1986) most of the research in sheep breeding and management in Western Canada has been conducted at the Manyberries Substation (1956 1970) and the Lethbridge Research Station (1970 1986). The primary fields of research were:

1. Evaluation of breeds.
2. Long-term selection experiment for weight-per-day-of-age.
3. Long-term crossbreeding experiment.
4. Assessment of lifetime production in semi-range environment.
5. Usefulness of Dorset Horn from the standpoint of the duration of breeding season and of Finnish Landrace from the standpoint of high prolificacy.
6. Year-round breeding controlled by light.
7. Importation of the Romanov breed.
8. Various related subjects of interest.

This report presents results in a summarized form to make them easily and quickly accessible for producers who do not have the time and patience to study long and difficult-to-understand scientific manuscripts. Those who would like to study these subjects in detail will find a list of references in this report. Another purpose of this report is to combine the results in one publication. Although all results have been made available at the completion of each study, it is believed that many of the useful results would be difficult to retrieve by those who are aware of their existence or by young producers who have entered the sheep enterprise in recent years.

1. EVALUATION OF BREEDS

Thirty years ago a great proportion of sheep in Western Canada was represented by range breeds such as Rambouillet, Romnelet, Canadian Corriedale, Romeldale, Columbia, Targhee and Corriedale.

Objective:

Determine which of the breeds is most productive under range conditions.

Results:

The range breeds represented by Rambouillet, Romnelet, Romeldale, Columbia, Targhee and Canadian Corriedale have equal potential for lamb production. There might be other factors in setting priorities of one over the others, for example the breed's temperament, horns, wool blindness, general ease of handling, conformation affecting prices of feeder and finished lambs, and wool quality and quantity.

References:

Scientific

Vesely, J. A. and H. F. Peters. 1964. The effects of breed and certain environmental factors on birth and weaning traits of range sheep. Can. J. Animal Sci. 44: 215-219.

Vesely, J. A. and H. F. Peters. 1965. Fertility, prolificacy, weaned lamb production, and lamb survival ability in four range breeds of sheep. Can. J. Anim. Sci. 45: 75-77.

Vesely, J. A., H. F. Peters and S. B. Slen. 1965. The effect of breed and certain environmental factors on wool traits of range sheep. Can. J. Anim. Sci. 45: 91-97.

Vesely, J. A., H. F. Peters and S. B. Slen. 1966. Lamb and wool production from five breeds on range. Can. J. Anim. Sci. 46: 9-18.

Vesely, J. A. and H. F. Peters. 1966. Feedlot performance of five breeds of sheep and their carcass characteristics. Can. J. Anim. Sci. 46: 139-148.

Vesely, J. A. and H. F. Peters. 1972. Interrelationship of bone, lean meat, and fat in five breeds of lamb. Can. J. Anim. Sci. 52: 629-636.

Fahmy, M. H. and J. A. Vesely. 1977. Wool yield and characteristics of Dorset, Leicester and Suffolk breeds and their 'DLS' cross. J. Agric. Sci., Camb. 88: 651-653.

Miscellaneous

Vesely, J. A. 1966. Which sheep breed is best for range? Canadian Wool Grower and Sheep Breeder, Vol. 37, No. 1: 21-22.

Vesely, J. A. 1978. Performance of the North Country Cheviot. Canada Agriculture, Spring 1978, 3-4.

Vesely, J. A. 1980. Comparing sheep breeds for lamb production in Western Canada. Canada Agriculture, Spring 1980, 30-31.

COMPARING SHEEP BREEDS FOR LAMB PRODUCTION IN WESTERN CANADA

J.A. VESELY

Toute information relative à la productivité de diverses races de moutons élevés sous les conditions qui prévalent dans l'Ouest s'avère très importante pour les producteurs ovins de cette région. La Direction de la recherche d'Agriculture Canada a effectué plusieurs expériences pour évaluer le potentiel de productivité des races les plus populaires de l'ouest canadien. L'article suivant résume et confronte les résultats de ces expériences.

Information on the production performance of various breeds of sheep under western range conditions is important to sheep producers in that area. Agriculture Canada's Research Branch has conducted several experiments evaluating the production potential of the most popular sheep breeds in Western Canada.

This article summarizes the highlights of these comparison experiments which have been reported in scientific papers[1]. The data were collected from four different periods between 1953 and 1978. Since management and experimental procedures have changed during these 26 years, relative ranking only can be obtained, not the actual performance of breeds.

Breeds tested were those suitable for the western range: at first the Rambouillet and later the Canadian Corriedale, Romnelet, Romeldale, Columbia and Targhee. These breeds represent the majority of sheep in the west known as "white-face" range sheep. They are all related and have some Rambouillet blood. Besides the six range breeds, Suffolk and North Country Cheviot, the most popular mutton breeds in Western Canada, were tested.

In the last phase of the breed testing, Dorset Horn and Finnish Landrace rams were investigated and the prolificacy of the half-Dorset and half-Finnish Landrace females assessed.

Four traits were used to compare the performance of the eight sheep breeds:

- prolificacy of ewes (number of lambs born per 100 ewes lambing);
- the lambs' weaning weight;
- overall lamb production per ewe expressed as weight of lamb weaned per ewe exposed to ram; and
- the growth rate of the lamb in the feedlot.

Prolificacy was somewhat variable among the breeds in the first experiment; however, the levels were not significantly different (Table 1). The second experiment confirmed that all range breeds generally have the same prolificacy (Table 2). However, Suffolk, a mutton breed, averaged 20 lambs per 100 ewes higher than that of the range breeds (Tables 2 and 3). The N.C. Cheviot, the other mutton breed, appeared to be between the Suffolk and the range breeds (Table 3).

The Rambouillet had the heaviest lambs at weaning of all range breeds (Tables 1 and 2). In the second experiment the Targhee showed the same ranking as Rambouillet. Lambs of the other range breeds were about equal in this trait but somewhat lower than Rambouillet and Targhee (Tables 1 and 2). The heaviest overall weaning weights were exhibited by the Suffolk and the lightest by the N.C. Cheviot (Tables 2 and 3).

The weight of lamb weaned per ewe exposed to ram was about the same for all six range breeds (Tables 1, 2 and 3). The Suffolk was significantly superior (Tables 2 and 3) and the N.C. Cheviot was significantly inferior (Table 3) to all breeds.

Feedlot gain was not tested in experiment 1. However, the results of experiments 2 and 3 demonstrated that feedlot gains of the range breeds are about the same and that gain of the Suffolk was superior (Tables 2 and 3).

Mortality rates of the Romnelet, Columbia, Suffolk and N.C. Cheviot were similar during their first four years. After that, the mortality rate increased in the N.C. Cheviot flock. The same phenomenon was observed in the Suffolk flock after six years. At the end of eight and one-half years the percentage of ewes remaining in the Romnelet flock was 22%, Columbia 25%, Suffolk 5% and N.C. Cheviot 0%. The average lifetime lamb produc-

TABLE 1. REPRODUCTION AND PRODUCTION TRAITS OF RAMBOUILLET, ROMNELET, CANADIAN CORRIEDALE AND ROMELDALE BREEDS OF SHEEP MEASURED IN YEARS FROM 1953 TO 1956 (EXPERIMENT 1)

Breed	Ewes exposed to rams	Prolificacy: Lambs born per 100 ewes lambing	Weaning wt (kg)	Wt of lamb weaned per ewe exposed to ram (kg)
Rambouillet	174	138	32.1	34
Romnelet	200	135	28.8	32
Can. Corriedale	196	145	27.4	30
Romeldale	199	154	28.0	30

[1]Further details and copies of these papers are available from the author

TABLE 2. REPRODUCTION AND PRODUCTION TRAITS OF RAMBOUILLET, ROMNELET, COLUMBIA, TARGHEE, AND SUFFOLK BREEDS OF SHEEP MEASURED IN THE YEARS FROM 1960 TO 1963 (EXPERIMENT 2)

Breed	Prolificacy		Weaning wt (kg)	Wt of lamb weaned per ewe exposed to ram (kg)	Gain/day of feedlot (kg)
	Ewes exposed to rams	Lambs born per 100 ewes lambing			
Rambouillet	158	157	33.9	42	0.15
Romnelet	159	157	32.4	42	0.13
Columbia	158	156	32.1	41	0.16
Targhee	159	150	33.7	43	0.18
Suffolk	158	181	34.4	49	0.20

TABLE 3. REPRODUCTION AND PRODUCTION TRAITS OF ROMNELET, COLUMBIA, SUFFOLK, AND NORTH COUNTRY CHEVIOT BREEDS OF SHEEP MEASURED IN THE YEARS FROM 1964 TO 1973 (EXPERIMENT 3)

Breed	Ewes exposed to rams	Prolificacy	Wt of lamb weaned per ewe exposed to ram (kg)	Total feedlot gain (kg)
		Lambs born per 100 ewes lambing		
Romnelet	212	143	25.3	12.2
Columbia	209	147	27.0	11.2
Suffolk	204	162	31.4	12.6
N.C. Cheviot	154	153	20.1	9.9

TABLE 4. BREEDS RANKED BY WEIGHT OF LAMB WEANED PER EWE EXPOSED TO RAM WITH RANKINGS FOR PROLIFICACY, WEANING WEIGHT, AND LIFETIME PRODUCTION OF LAMB PER EWE

Breed	Prolificacy	Weaning weight	Weight of lamb weaned per ewe exposed to ram	Lifetime production of lamb per ewe
Suffolk	1	1	1	1
Rambouillet	3	2	2	†
Romnelet	5	4	3	2
Romeldale	6	6	4	†
Targhee	7	3	5	†
Columbia	4	5	6	3
Canadian Corriedale	8	7	7	†
N.C. Cheviot	2	8	8	4

†Not measured

tion per ewe was 149.5 kg for Suffolk, 146.6 kg for Romnelet, 119.3 kg for Columbia and 92.1 kg for N.C. Cheviot.

Summarizing breed comparisons Suffolk proved to be the best in lamb production. The range breeds represented by Rambouillet, Romnelet, Romeldale, Columbia, Targhee and Canadian Corriedale have equal potential for lamb production and the ranking among them is not significant (Table 4). There might be other factors in setting priorities of one over the others, for example the breed's temperament, general ease of handling, conformation affecting prices of feeder and finished lambs and wool quality and quantity. The N.C. Cheviot was ranked at the bottom of the scale in lamb production. However, based on results from our crossbreeding experiments, this breed can be useful in crossbreeding systems.

If Dorset Horn and Finnish Landrace sires are used to produce crossbred breeding ewes in a practical breeding program, only a proportion of the ewe lambs would be retained for breeding; the remainder and the wethers would be fed out and sold. The growth potential and carcass grades of lambs sired by Dorset Horn or Finnish Landrace rams were determined. Weaning weights and weight-per-day-of-age to market were the same for both groups. Carcasses from Finnish sires were of a slightly better average grade than those from Dorset ewes, mainly because they were leaner. Therefore, when used as sires to produce crossbred breeding ewes, both Dorset and Finnish rams will produce crossbred lambs with satisfactory growth and carcass merit.

In prolificacy tests for half-Dorset and half-Finnish ewes, average lambing rates (number of lambs born per 100 ewes lambing) based on three consecutive lamb crops when the ewes were one, two and three years old were half-Dorset 169 and half-Finnish 242. These results prove that the Finnish breed has a great potential for increasing prolificacy.

Dr. Vesely is an animal geneticist at the Agriculture Canada Research Station, Lethbridge, Alberta.

EVALUATION OF RANGE BREEDS

	Wean wt.	Total kg of lamb weaned	$Value*
Rambouillet	34.0	42.0	14.78
Romnelet	32.4	42.3	14.90
Columbia	32.1	41.0	14.43
Targhee	33.8	42.9	15.00
Can. Corriedale	29.0	37.0	13.00
Romeldale	29.6	38.1	13.40

*Feeder weights at 35.2 cents per kg

Suffolk	34.5	48.6	17.12

2. SELECTION FOR WEIGHT-PER-DAY-OF-AGE

Objective:

Estimate genetic variation of production traits in Rambouillet and Romnelet sheep and measure response to selection for weight per day of age only.

Results:

Reasonable gains by selection were obtained even if only a moderately small genetic variation existed. However, improvement was achieved with the maximum selection intensity possible by retaining each year, on the average, 4% of the males and 22% of the females in each breed. Response to selection was about 0.01 kg/yr. This means that, if the average weight per day of age (WPDA) of the flock at the beginning of the experiment was 0.25 kg, after 5 years of selection the average WPDA in the flock was 0.30 kg. Although selection was practised on WPDA only, positive correlated gains were also achieved in weaning weight and post weaning gain.

References:

Scientific

Vesely, J. A. and S. B. Slen. 1961. Heritabilities of weaning weight, yearling weight, and clean fleece weight in range Romnelet sheep. Can. J. Anim. Sci. 41: 109 114.

Vesely, J. A., H. F. Peters, S. B. Slen and O. W. Robison. 1970. Heritabilities and genetic correlations in growth and wool traits of Rambouillet and Romnelet sheep. J. Anim. Sci. 30: 174 181.

Vesely, J. A. and O. W. Robison. 1970. Genotype sex interactions in sheep. J. Anim. Sci. 31: 273 277.

Vesely, J. A. and H. F. Peters. 1975. Response to selection for weight per day of age in Rambouillet and Romnelet. Can. J. Anim. Sci. 55: 1 8.

Miscellaneous

Vesely, J. A. 1975. Increasing lamb production by selection. Canada Agriculture. Fall 1975, 28 29.

INCREASING LAMB PRODUCTION BY SELECTION

J. A. VESELY

Selon les chercheurs de la Station de recherche de Lethbridge, la sélection peut permettre d'améliorer de façon raisonnable les aptitudes de production des moutons même si la variation génétique est modérément faible. Pour améliorer génétiquement un troupeau, il faut sélectionner les agneaux dont le rendement est supérieur à la moyenne des autres sujets du troupeau. Les béliers peuvent réaliser des progrès génétiques plus rapides, car plus la variation à la sélection est marquée, plus l'amélioration génétique est importante.

A breeder can use genetics in two ways to improve production traits. First, he can carefully select the individuals to be used as parents and, second, he can control the way in which the parents are mated by crossbreeding. Gains in production by crossbreeding are relatively easier to determine. Any sheep producer can raise both purebred and crossbred lambs on his farm and measure the difference in production between the two groups. However, improvement in production by selection is much more difficult to measure and the techniques used for measuring genetic trends are much more sophisticated and not easily understood by the average sheep producer. Very few breeders of pure livestock know how much genetic improvement has been made in their animals over a period of years or over the lifetime of the breeder.

At the Manyberries Substation of the Lethbridge Research Station, we conducted an experiment designed to measure the response to selection for one trait only (weight-per-day-of-age, WPDA) and also to determine correlated responses of other traits (weaning weight, WW; and post-weaning gain, PWG) in two breeds of sheep (Rambouillet, Romnelet). The foundation flocks for this study consisted of 150 Rambouillet and 150 Romnelet ewes.

The sheep were maintained in the experiment from 1966 to 1970 under range conditions at the Manyberries Substation. Breeding was scheduled each year from November 15 to December 19. All lambs were weighed at weaning on August 8 and then fed a pelleted ration individually for 70 days. The ration was as follows: alfalfa hay, 61.5 percent; molasses, 10 percent; barley, 28 percent; monosodium phosphate, 0.25 percent; salt (cobalt-iodized), 0.25 percent; and 1 million IU of vitamin D per ton. Replacement ram and ewe lambs were selected within breed and sex for WPDA at the end of the postweaning feeding trial (average age 170 days). Ewes were replaced with lambs at death, or because of faulty udders or "broken" mouths, if barren in 2 successive years; or when 6.5 yr old. The flocks were maintained at a constant size of 150 ewes.

Estimating genetic change is not easy and the methods used are relatively new. For accuracy, this experiment was designed to use two methods of measuring genetic change. A brief description of the methods will demonstrate that to measure genetic change, the breedings must be planned and adhered to throughout the experimental period.

Method I measured the genetic change by the difference between the linear regression of performance on time for the breed concerned and the pooled within-sire regression of progeny performance on time. Method II used repeated matings to estimate environmental change. These repeated matings gave two groups of full sibs (lambs having the same father and mother) born in successive years. The means from the full sibs were used to estimate evironmental differences between years. The response from selection was measured as a difference, in intra-year comparisons, between means of progenies of selected sires and means of environmental trend.

Selection Differential

For a breeder to genetically improve his flock, he must select lambs that are superior in performance to the average for all lambs in the flock. The difference between the average performance of the selected lambs and that of all lambs is called selection differential.

The results demonstrate that more rapid genetic progress can be made

Dr. Vesely is an animal geneticist at the CDA Research Station, Lethbridge, Alta.

by rams since the greater the selection differential, the greater the genetic improvement (Table 1). The largest possible selection differential would be obtained if only the best animal were selected. When there are two, three, or more animals selected, the maximum selection differential is reduced accordingly. Since in this experiment, on the average, only 6 ram lambs and 33 ewe lambs were selected within breed every year, the male selection differentials are much higher. The selection differential of Rambouillet ram lambs in year 1 implies that, for example, if the average WPDA of all Rambouillet ram lambs in that year was 0.60 lb, the average WPDA of the selected ram lambs was 0.71 lb.

TABLE 1 WEIGHTED SELECTION DIFFERENTIALS FOR WEIGHT-PER-DAY-OF-AGE (WPDA, LB) IN FOUR LAMB CROPS OF TWO BREEDS

	Rambouillet		Romnelet	
Year	♂	♀	♂	♀
1	0.11	0.00[1]	0.08	0.03
2	0.12	0.04	0.07	0.04
3	0.12	0.03	0.07	0.05
4	0.15	0.04	0.12	0.05

[1] Zero selection differential because the selected females did not raise any lambs that year.

TABLE 2 YEARLY MEANS OF WEIGHT-PER-DAY-OF-AGE (WPDA, LB), WEANING WEIGHT (WW, LB), AND POSTWEANING GAIN (PWG, LB)

	Rambouillet			Romnelet		
Year	WPDA	WW	PWG	WPDA	WW	PWG
1	0.52	64.0	28.8	0.49	62.5	27.7
2	0.48	56.5	33.7	0.46	54.8	31.5
3	0.55	59.4	40.9	0.52	57.4	39.4
4	0.57	62.5	41.8	0.56	62.5	41.6
5	0.60	62.7	43.1	0.58	58.1	43.6

Genetic Trend

Genetic improvement cannot be obtained from the absolute measurements collected from year-to-year because the performance can be greatly influenced by environment. Some progress was made in WPDA and PWG but apparently none was achieved in WW (Table 2). Even the gains in WPDA and PWG were not entirely genetic gains.

Genetic Gain

By knowing the degree of heritability and the selection intensity applied (selection differential), it is possible to estimate expected response from selection. This was done for the traits studied in this experiment and the obtained values compared to the responses measured by the two methods (Table 3).

The expected and measured responses are very similar. For example, in Rambouillet the expected and measured response was about 0.02 lb/yr. This means that, if the average WPDA of the flock at the beginning of the experiment was 0.50 lb, after 5 yr of selection the average WPDA in the flock would be 0.60 lb. The measured correlated responses in PWG are in agreement with the expected responses. Values for WW are somewhat variable, probably because it can be easily influenced by environment. It appears that the methods used did not remove the environmental variation entirely. Nevertheless, although selection was practised on WPDA, positive correlated gains were also achieved in WW and PWG.

Limits of Selection

Reasonable gains in production can be obtained by selection even if only a moderately small genetic variation exists. However, improvement was achieved with the maximum selection intensity possible, retaining each year in each breed, on the average, 4 percent of the males and 22 percent of the females. Response to selection over several generations gives no indication of the unknown limits of artificial selection.

Tentative answers to selection limits can be drawn, probably with some degree of error, from studies with laboratory animals such as mice and rats. Results of long-term experiments with mice for up to 80 generations can be equivalent to studies for 200 yr with sheep. By applying knowledge from such experiments to the results of this experiment, it can be postulated that an annual response of 0.02 lb in WPDA could continue in the two experimental flocks for 13 to 39 yr, which would be equivalent to 5 to 16 generations.

Some of the methods for estimating genetic change, for example Method I, are not as complicated as they appear. It is possible under minimum guidance to measure genetic improvements on a national, provincial, and individual flock basis. ■

TABLE 3 ANNUAL EXPECTED AND ESTIMATED RESPONSES TO SELECTION FOR WEIGHT-PER-DAY-OF-AGE (WPDA) AND CORRELATED RESPONSES IN WEANING WEIGHT (WW) AND POSTWEANING GAIN (PWG)

Method of calculation	Rambouillet, lb			Romnelet, lb		
	WPDA	WW	PWG	WPDA	WW	PWG
Expected	.015	1.10	1.25	0.012	0.66	1.12
Method 1	.021	2.42	1.41	0.013	2.64	0.99
Method 2	.020	1.32	1.23	0.017	1.98	0.92

3. CROSSBREEDING IN SHEEP

A. Thirty years ago the majority of commercial sheep producers maintained flocks of range breeds of Rambouillet background. The common mutton breeds in Western Canada were Suffolk, Hampshire and North Country Cheviot. At the request of the sheep producers, a crossbreeding experiment was initiated in 1959.

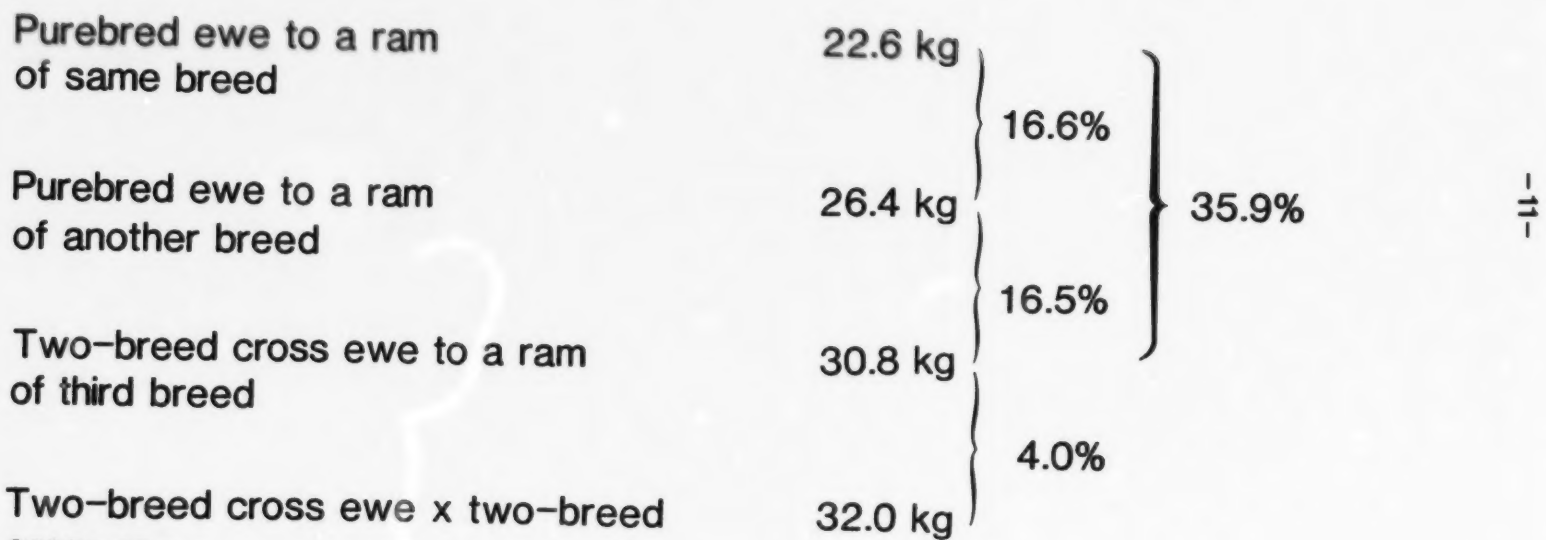
Objective:

Using the most popular breeds of sheep in Western Canada, (Romnelet, Columbia, Suffolk and N.C. Cheviot) estimate to what degree production of lamb could be increased by cross-breeding.

Results:

The average weight of lamb at weaning produced by the purebred ewes of the four breeds was 22.6 kg. When purebred ewes were exposed to a ram of a different breed the weight of lamb was increased to 26.4 kg. Two-breed cross ewes exposed to a ram of a third breed produced 30.8 kg. Two-breed cross ewes exposed to a two-breed cross ram (4-breed combination) produced 32.0 kg.

TOTAL WEIGHT OF LAMB AT WEANING PER EWE EXPOSED TO RAM



B. When the crossbreeding experiment was finished, many different genetic types of ewes were assembled: purebred ewes representing the four breeds, and two-breed, three-breed and four-breed combinations from these breeds. All such ewes were exposed to Dorset Horn or Finnish Landrace rams.

Objective:

Estimate the effect of crossbreeding on lifetime (6 and 7 years) production of lamb at weaning.

Results:

Average lifetime production of purebred ewes (Romnelet, Columbia, Suffolk and N.C. Cheviot) was 124 kg. When these ewes were exposed to Dorset Horn or Finnish Landrace rams the average lifetime production was 148 kg. A two-breed cross ewe (any two-breed combination of the four breeds) exposed to Dorset Horn or Finnish Landrace rams gave an average lifetime production of 180 kg. A three-breed cross ewe (any three-breed combination of the four breeds) exposed to Dorset Horn or Finnish Landrace rams produced on the average in her lifetime 189 kg. A four-breed crossbred ewe (any combination) produced in her lifetime, when exposed to Dorset or Finn rams, an average of 189 kg.

References:

Scientific

Vesely, J. A. and H. F. Peters. 1972. Lamb growth performance of Romnelet, Columbia, Suffolk and N.C. Cheviot breeds and all single and three-breed crosses among them. Can. J. Anim. Sci. 52: 283-293.

Vesely, J. A. and H. F. Peters. 1974. Lamb production from ewes of four breeds and their two-breed and three-breed crosses. Can. J. Anim. Sci. 54: 543-549.

Vesely, J. A., G. C. Kozub and H. F. Peters. 1977. Additive and non-additive genetic effects on growth traits in matings among Romnelet, Columbia, Suffolk, and North Country Cheviot breeds. Can. J. Anim. Sci. 57: 233-238.

Vesely, J. A. 1978. Performance of progeny of Finnish Landrace and Dorset Horn rams mated to ewes of various breeds and crosses. Can. J. Anim. Sci. 58: 399-408.

Vesely, J. A. and H. F. Peters. 1979. Lamb growth performance of certain pure breeds and their 2-, 3-, and 4-breed crosses. Can. J. Anim. Sci. 59: 349-357.

Vesely, J. A. and H. F. Peters. 1981. Lamb production from ewes of four breeds and their two-, three- and four-breed crosses. Can. J. Anim. Sci. 61: 271-277.

Miscellaneous

Vesely, J. A. 1971. Sheep crossbreding in Western Canada. Weekly Letter No. 1966. Research Station, Lethbridge, Alberta.

Vesely, J. A. 1973. Increased production of lamb by crossbreeding. Canada Agriculture. Spring 1973, 26-27.

AVERAGE LIFETIME PRODUCTION OF LAMB OF PUREBRED AND CROSSBRED EWES UNTIL THE AGE OF 6 AND 7 YEARS

Mating type	Wt. of lamb, kg	% Gain
X♂ x X♀	124	0
D or F♂ x X♀	148	19
D or F♂ x XY♀	180	45
D or F♂ x XYZ♀	189	52
D or F♂ x XYZW♀	189	52

X Any one of the four pure breeds
XY Two-breed cross ewe
XYZ Three-breed cross ewe
XYZW Four-breed cross ewe
D = Dorset, F = Finn

C. Prolificacy of ewes estimated across all ages appeared to be very little affected by crossbreeding. Some additonal information on prolificacy was obtained from the ewes kept for a longevity study. Levels of prolificacy were contemporaneously estimated within each year of age for four genetic types of ewes, purebreds, 2-, 3-, and 4-breed crosses.

Objective:

Estimate effect of crossbreeding on prolificacy of ewes.

Results:

In four of the seven age levels, significant differences due to genetic type of ewe were obtained and the ranking of prolificacy levels among the 2-, 3-, and 4-breed cross ewes was inconsistent. However, the purebred ewes had predominantly lower prolificacies throughout their life than the crossbred ewes. Therefore, although this trait appeared to be only slightly affected by the genetic type of the ewe, it is apparent that the insignificantly lower prolificacy of purebreds than that of the crossbreds could have a cumulative effect and contribute significantly to the difference in lifetime production between the purebred and crossbred ewes.

References:

Scientific

Vesely, J. A. and H. F. Peters. 1981. Lamb production from ewes of four breeds and their two-, three-, and four-breed crosses. Can. J. Anim. Sci. 61: 271-277.

MEANS OF PROLIFICACY % IN PUREBRED, 2-, 3- AND 4- BREED CROSS EWES CALCULATED WITHIN SEVEN AGE LEVELS

	Ewes			
Age, yr.	Purebred	2-breed	3-breed	4-breed
1	105	101	104	109
2	127	130	141	149
3	125	141	144	149
4	150	156	171	163
5	142	167	172	167
6	153	162	165	172
7	127	156	117	137

D. The Finnish Landrace is established as a highly prolific breed that should be used in developing commercial crossbred ewe flocks. A total of 108 half-Finn ewes were used in an experiment to evaluate Finn-cross ewes for lamb production. They were 3 and 4 years old when the experiment started; therefore, those that survived were 7.5 and 8.5 years old when the experiment finished. The number of lambs produced at birth over a 4.5-year period per ewe in the original flock was recorded. Thus, the trait measured not only the prolificacy of the ewes but also their attrition (those dead or culled) over the duration of the experiment.

Objective:

Determine which of the various Finn crosses is most productive in bringing lambs to birth over a period of 4.5 years.

Results:

The results implied that if the dam breeds exposed to Finn rams are primarily range breed (0.75 to 1.0), then the lifetime lamb production of the crossbred female would tend to tip to the lower end of the scale. If the dam breeds are 0.5 to 1.0 of the mutton breeds the total lamb production would move up the scale. The key is the high productivity of the Suffolk ewe. When crossed with the Finn, the Finn x Suffolk crossbred ewe was the best in terms of lamb production: 2.31 lambs annually per ewe that started the experiment.

References:

<u>Miscellaneous</u>

Vesely, J. A. 1983. Several Finn crosses evaluated for lamb production. Sheep Canada Magazine, Fall, p.19.

Table 1. Total and annual lamb production of half-Finn ewes during 4½ years

Cross of ewe	No. of ewes	Total no. of lambs born per ewe in original flocks	No. of lambs born per ewe annually
FR,FC,FN†	19	7.89	1.75
FS†	5	10.40	2.31
FSN,FNS	6	7.67	1.70
FRC,FCR	7	5.71	1.27
FSR,FNR,FSC,FNC	32	9.59	2.13
FRCS,FCRN,FCRS,FRCN††	7	8.29	1.84
FNSC,FSNC,FNSR,FSNR††	9	13.00	2.89
FSCNR†††	15	7.33	1.63
FSCR,FNCR,FSRC,FNRC††	8	10.50	2.33

† R=Romnelet, C=Columbia, N=North Country Cheviot, S=Suffolk, first letter F denotes 50% of Finnish Landrace breeding on paternal side.

†† Maternal side of this ewe was a 3-breed cross dam (last three letters) based on mating of purebred ram and crossbred ewe (last two letters).

††† Maternal side of this ewe was a 4-breed cross dam (last four letters), based on mating of crossbred ram and crossbred ewe (last two letters — any combination).

4. ASSESSMENT OF LIFETIME PRODUCTION

There is a general belief that crossbred ewes have a longer productive life than purebreds.

Objective:

Determine if crossbred ewes have a prolonged productive life.

Results:

Our results, under the conditions of the experiment, suggested that crossbred ewes do not have a longer productive life. After 7 years of production, purebred ewe flocks on the average were reduced by 61%, 2-breed cross ewe flocks by 54%, 3-breed cross ewe flocks by 60%, and 4-breed cross ewe flocks by 62%. However, differences in longevity existed between pure breeds. Ewes of the two range breeds, Romnelet and Columbia, had lower mortality rates than N.C. Cheviot. At the end of 8.5 years of production, the percentage of ewes remaining in the Romnelet, Columbia, Suffolk, and N.C. Cheviot flocks was 22, 25, 5 and 0%, and the average lifetime production was 147, 119, 150 and 92 kg.

References:

Scientific

Vesely, J. A. and H. F. Peters. 1974. Lamb production from ewes of four breeds and their two-breed and three-breed crosses. Can. J. Anim. Sci. 54: 543-549.

Vesely, J. A. and H. F. Peters. 1981. Lamb production from ewes of four breeds and their two-, three-, and four-breed crosses. Can. J. Anim. Sci.61: 271-277.

Miscellaneous

Vesely, J. A. 1979. Crossbreeding in sheep. Research Highlights - 1978. Research Station, Lethbridge, Alberta.

CUMULATIVE ANNUAL PERCENT REDUCTION OF 4 PUREBRED FLOCKS OVER A PERIOD OF 8 1/2 YEARS

Age	N.C. Cheviot	Suffolk	Columbia	Romnelet
1	10.0	9.5	9.8	8.3
2	25.0	19.0	19.7	21.7
3	35.0	23.8	34.4	26.7
4	47.5	31.7	36.0	36.7
5	67.5	49.2	45.9	38.3
6	85.0	68.3	63.9	50.0
7	92.5	84.1	72.1	63.3
8	100.0	95.2	75.0	78.0
Avg lifetime production	92 kg	150 kg	119 kg	147 kg

CUMULATIVE ANNUAL PERCENT REDUCTION OF PUREBRED, 2-, 3- and 4- BREED CROSS EWES UNTIL THE AGE OF 7 YEARS

Age	Purebred	2-breed	3-breed	4-breed
1	3.2	1.6	0.0	0.0
2	3.2	8.2	1.5	1.3
3	9.7	13.1	13.0	7.7
4	19.7	19.7	21.4	26.9
5	38.7	28.7	34.1	33.3
6	50.0	47.5	50.0	51.3
7	60.6	54.2	60.3	61.9

5. USEFULNESS OF FINNISH LANDRACE AND DORSET HORN BREEDS

A. Finnish Landrace sheep are known for their high prolificacy. Female offspring from matings of Dorset Horn and Finnish Landrace rams with purebred (Romnelet, Columbia, Suffolk, N.C. Cheviot), two-breed, three-breed, and four-breed cross ewes were retained for breeding. Maternal sides of the half-Dorset and half-Finnish ewes were genetically equal so that any differences between the two groups were due to the Dorset or Finnish sires.

Objective:

Determine how much prolificacy would be improved by utilizing crossbred Finnish ewes.

Results:

Lambing rates showed that the Finnish breed has a great potential for increasing prolificacy. The conception rates in both flocks were equal; thus, the increased lambing rates of the half-Finnish ewes over those of the half-Dorset ewes have been due to the high prolificacy of the Finnish breed.

References:

Miscellaneous

Vesely, J. A. 1979. Crossbreeding in sheep. Research Highlights - 1978. Research Station, Lethbridge, Alberta.

NUMBER OF LAMBS BORN PER 100 HALF-DORSET HORN OR HALF-FINNISH LANDRACE EWES EXPOSED TO RAMS IN 3-YR PRODUCTION

Year	Age	1/2 Dorset	1/2 Finn
1976	1	177	231
1977	1 & 2	152	238
1978	2 & 3	177	256

B. Dorset Horn breed is known for its long breeding season. Some producers go as far as saying that Dorsets breed year-round. In one of our experiments we were able to test this hypothesis. Half Dorset ewes were bred conventionally once a year in the fall (Control I) or every 8 months maintained under natural daylight (Control II) or under an artificial photoperiod (Treatment).

Objective:

Determine if half Dorset ewes bred out-of-season (May) would have an acceptable conception level without an induction to breed agent.

Results:

In May 1979, conception rate for crossbred Dorset ewes was 3%, and in 1981, it was 15%. These results prove that Dorset breeding in the crossbred ewes did not bring satisfactory levels of conception rates at this time of year under natural daylight conditions.

References:

Scientific

Vesely, J. A. and E. E. Swierstra. 1985. Year-round breeding of crossbred Dorset or Finnish Landrace ewes using a synthetic light regimen. J. Anim. Sci. 61: 329-336.

CONCEPTION RATES OF CROSSBRED DORSET EWES IN FIVE 365-DAY PRODUCTION CYCLES (control 1) AND SEVEN 240-DAY PRODUCTION CYCLES (control II and light treatment)

Breeding period	Conception Control I No.	%	Control II No.	%	Light Treatment No.	%
November 1977	34/35	97				
January 1978			27/33	82	26/30	87
September 1978			31/31	100	19/29	66
October 1978	31/32	97				
May 1979			1/31	3	23/26	82
October 1979	27/29	93				
January 1980			27/34	79	24/30	80
September 1980					24/27	89
October 1980	25/26	96	26/28	93		
May 1981			4/26	15	24/25	96
October 1981	26/26	100				
January 1982			23/24	96	20/22	91

6. YEAR-ROUND BREEDING CONTROLLED BY LIGHT

A. Over a period of many years experiments have been run to develop a technique of light control for year round breeding. The final experiment gave results demonstrating that the light control technique is effective.

Objective:

Determine if year-round breeding achieved by light control, which gives three lamb crops in 2 years, is more efficient than the conventional once-a-year breeding.

Results:

The recently completed experiment with half-Dorset or half-Finn ewes proved that it is possible to produce lamb crops year- round with a substantial increase in the annual output of lambs per ewe. However, it also demonstrated that it is necessary to raise the additional lambs to market in order to benefit. The advantage of crossbred Finn ewes in lamb production under the conditions of this experiment practically disappeared due to high mortalities of lambs and attrition of ewes, when comparing kilograms of lamb marketed per ewe of established flock. The total weight of lamb marketed over a period of 4.5 years was 243 kg per ewe under the conventional system and 266 kg under light control. The average number of kilograms of lamb marketed from crossbred Finn ewes was even lower (243 kg) than that from crossbred Dorset ewes (247 kg).

References:

Scientific

Vesely, J. A. and E. E. Swierstra. 1985. Year-round breeding of crossbred Dorset or Finnish Landrace ewes using a synthetic light regimen. J. Anim. Sci. 61: 329-336.

Miscellaneous

Vesely, J. A. 1985. Higher lamb production demands intensified management. Sheep Canada Magazine. Summer 1985, p.3-5.

CONCEPTION RATES OF CROSSBRED DORSET AND CROSSBRED FINN EWES IN FIVE 365-DAY PRO - DUCTION CYCLES MAINTAINED UNDER NATURAL LIGHT

Breeding period	Half-Dorset		Half-Finn	
	No.	%	No.	%
November 1977	34/35	97	33/35	94
October 1978	31/32	97	30/33	91
October 1979	27/29	93	17/30	57
October 1980	25/26	96	23/24	96
October 1981	26/26	100	22/22	100

CONCEPTION RATES OF CROSSBRED DORSET AND CROSSBRED FINN EWES IN SEVEN 240-DAY PRO - DUCTION CYCLES MAINTAINED UNDER NATURAL LIGHT

Breeding period	Half-Dorset		Half-Finn	
	No.	%	No.	%
January 1978	27/33	82	25/34	74
September 1978	31/31	100	27/32	84
May 1979	1/31	3	1/31	3
January 1980	27/34	79	28/33	85
September 1980	26/28	93	21/26	81
May 1981	4/26	15	10/23	43
January 1982	23/24	96	17/19	89

CONCEPTION RATES OF CROSSBRED DORSET AND CROSSBRED FINN EWES IN SEVEN 240-DAY PRODUCTION CYCLES MAINTAINED UNDER LIGHT TREATMENT

Breeding period	Ewes			
	Half-Dorset		Half-Finn	
	No.	%	No.	%
January 1978	26/30	87	22/34	65
September 1978	19/29	66	24/31	77
May 1979	23/28	82	20/27	74
January 1980	24/30	80	22/28	79
September 1980	24/27	89	24/27	89
May 1981	24/25	96	19/20	95
January 1982	20/22	91	14/15	92

PRODUCTION OF LAMB MARKETED OVER A PERIOD OF 4-1/2 YEARS

Half-Dorset	257 kg
Half-Finn	243 kg
Control I	243 kg
Control II	241 kg
Treatment	266 kg

MORTALITIES OF LAMBS

Control I	20%
Control II	20%
Treatment	21%
1/2 Dorset	15%
1/2 Finn	27%

ATTRITION RATES OF EWES

	Control I		Control II		Treatment	
	*D	*F	D	F	D	F
Initial No.	35	34	33	34	30	34
Remaining No.	26	22	24	19	22	15
Attrition %	26	35	27	44	27	56
Annual attrition %	5	7	5	9	5	11

* D = 1/2 Dorset
F = 1/2 Finn

B. Research on the induction of breeding in sheep has been conducted for many years. The following is a detailed description of the procedure that was applied in the final experiments.

Light Control

Ewes were bred three times in 2 years commencing on January 1, September 1 and May 1. They were continuously maintained under an artificial light regimen of fluctuating periods of long and short daylength. Each production cycle of 240 days starting on day 0 (commencement of breeding period) consisted of 33 days with 8 hours daylength, followed by a period of abruptly increased daylength to 16 hours for another 120 days. During the next 87 days the daylength was maintained at 8 hours/day. Thus, each production cycle consisted of a 4-month period of long days (16 hours light) and a 4-month period of short days (8 hours light; see figure). Dates of breeding, lambing, weaning and daylength for the light control were as follows:

Day 0 - start breeding, 8 hours of daylight;
Day 33 - extend daylight abruptly to 16 hours;
Day 145 - start lambing;
Day 153 - reduce daylight to 8 hours;
Day 180 - lambing ends;
Day 210 - weaning;
Day 240 - end of production cycle;
Day 241 - day 0 - start breeding.

An insulated barn without windows was used. Air exchange was maintained by fans according to size of rooms and number of animals in them. Artificial light was supplied by high-pressure mercury lamps that emitted light in the range including normal wavelengths and the cool ultraviolet rays, with an average light intensity of 245 lux at 1 m above the ground. When the animals were exposed to 16 hours of light, lamps were on from 0400 to 2000 hour. Under the 8-hour daylength, light was on from 0800 to 1600 hour. All ewes had access to outside paddocks from 0800 to 1600 hour.

Management

About 2.5 kg of hay/head were fed. When it was necessary to increase energy consumption at any stage of the production cycle, to increase gains, or to meet energy requirement of late pregnancy or lactation, barley was fed in amounts up to 0.7 kg/head. A corresponding reduction in the amount of hay offered was necessary to permit adequate consumption of higher energy feed. About 10 days before weaning, barley was withdrawn from the diet and the amount of hay was reduced gradually each day and replaced by straw. By weaning time, each ewe had received the hay-straw diet for 2 days, which supplied energy slightly below her maintenance level. After weaning, the amount of hay in the diet was gradually increased and the straw

decreased until it again reached the normal level for nonlactating, nonpregnant ewes. More information on management was published (see Miscellaneous Reference).

References:

Scientific

Vesely, J. A. 1975. Induction of lambing every eight months in two breeds of sheep by light control with or without hormonal treatment. Anim. Prod. 21: 165-174.

Vesely, J. A. 1978. Application of light control to shorten the production cycle in two breeds of sheep. Anim. Prod. 26: 169-176.

Vesely, J. A. and D. M. Bowden. 1980. Effect of various light regimens on lamb production by Rambouillet and Suffolk ewes. Anim. Prod. 31: 163-169.

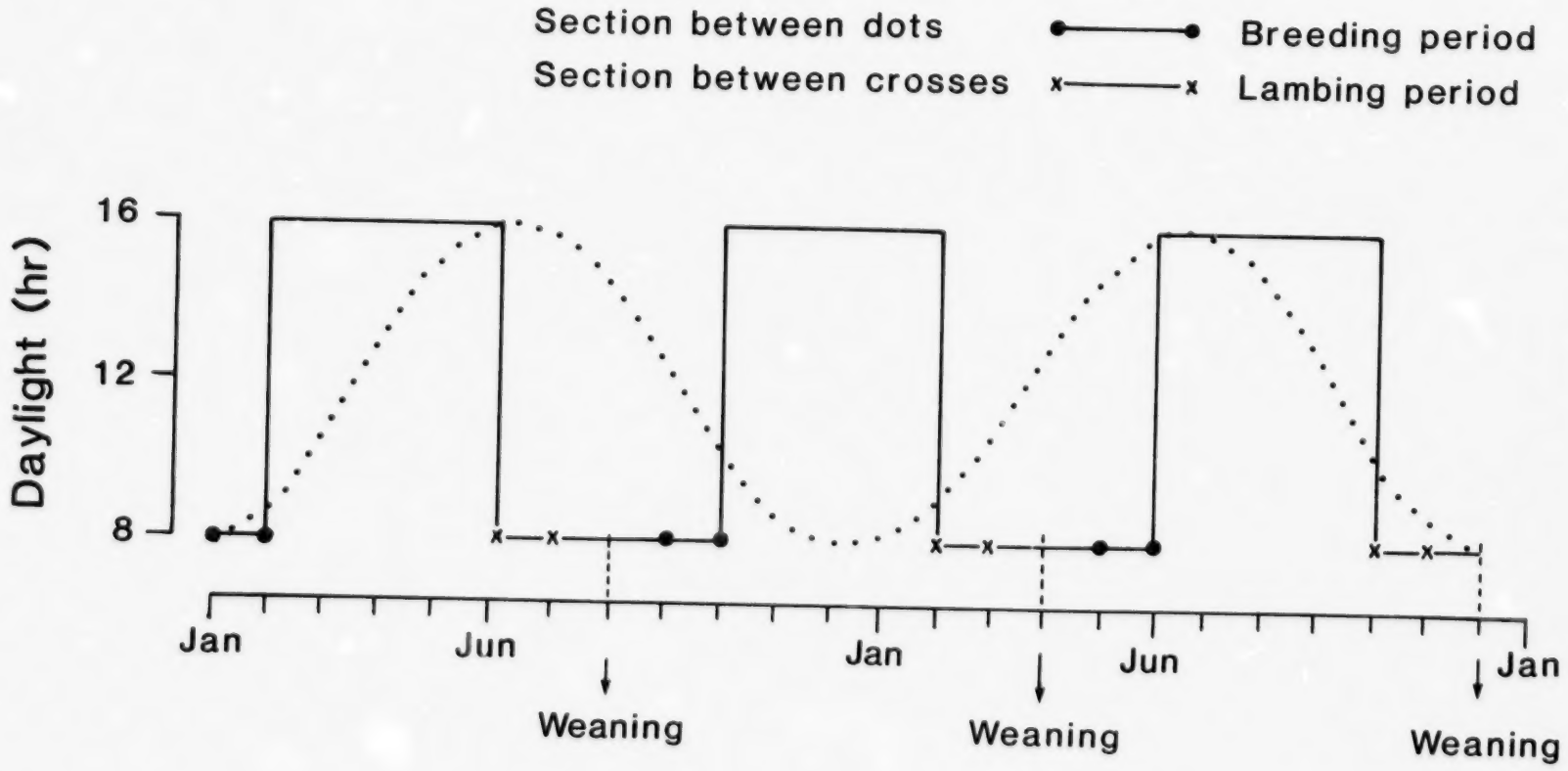
Vesely, J. A. and E. E. Swierstra. 1985. Year-round breeding of crossbred Dorset or Finnish Landrace ewes using a synthetic light regimen. J. Anim. Sci. 61: 329-336.

Miscellaneous

Vesely, J. A. 1980. Induction of year-round breeding with light control - answers to your questions. Sheep Canada Magazine, Winter 1980, p. 19-21.

Figure 1.

Artificial light pattern in relation to the natural light pattern (dotted line).



7. IMPORTATION OF THE ROMANOV BREED

Romanov ewes and rams were imported into Eastern Canada in 1980. In 1982, eight Romanov rams were transferred to the Lethbridge Research Station for crossbreeding experiments. Three-quarter Dorset Horn (D), 3/4 Finnish Landrace (F) and Western range ewes (Rambouillet and Romnelet, W) were mated by Dorset Horn (D), Finnish Landrace (F), Romanov (R) and Western range (W) rams. Thus, eight genetic types of lambs, Dorset x 3/4 Dorset (DD), Dorset x 3/4 Finn (DF), Finn x 3/4 Dorset (FD), Finn x 3/4 Finn (FF), Romanov x 3/4 Dorset (RD), Romanov x 3/4 Finn (RF), Romanov x Western (RW) and Western x Western (WW), were born in several lamb crops and evaluated.

Objective:

Determine the contribution the Romanov breed can make to the Canadian sheep industry in crossbreeding plans.

Results:

Romanov has two main beneficial characteristics that could be exploited in crossbreeding plans. First, it is early maturing. All Romanov crossbred ewe lambs conceived almost one month sooner than the other crosses. The second outstanding trait is its prolificacy. It is even slightly higher than that of the Finn. Growth trait is of no merit to the breed; it is slightly lower than that of the Dorset. Romanov wool is of low quality. Half-Romanov crossbreds had an average spinning count of 47 corresponding to 1/4 staple. The fleece of crossbreds can have colored spots or be entirely black.

References:

Scientific

Vesely, J. A. and E. E. Swierstra. 1986. Reproductive parameters of crossbred ewe lambs sired by Romanov, Finnish Landrace, Dorset and Western range rams. J. Anim. Sci. 62: 1555-1562.

Vesely, J. A. 1987. Performance of crossbred lambs from Romanov, Finnish Landrace, Dorset Horn and Western range rams and three-quarter Finnish Landrace, three-quarter Dorset Horn and Western range ewes. J. Anim. Sci. (in press).

Vesely, J. A. and E. E. Swierstra. 1987. Reproduction traits of ewe lambs representing eight genetic types born in winter, spring, summer and fall. J. Anim. Sci. (in press).

PERFORMANCE OF CROSSBRED LAMBS

Cross	Ovulation rate	Litter size	Conception weight, kg	Conception age, days
DD	1.5	1.3	48	236
DF	1.5	1.4	45	218
FD	2.2	1.8	47	234
FF	2.6	2.3	44	228
RD	2.2	2.0	44	209
RF	2.7	2.4	44	213
RW	2.1	2.1	49	222
WW	1.0	1.0	51	247

PERFORMANCE OF CROSSBRED LAMBS

Cross	Wean wt, lb	Feedlot ADG, lb	Survival, %	Days to market
DD	42.2	.55	93	105
DF	34.1	.55	86	116
FD	35.9	.55	82	115
FF	40.3	.57	91	99
RD	40.3	.54	93	101
RF	34.8	.54	85	116
RW	42.9	.59	88	97
WW	40.5	.59	88	108

8. VARIOUS RELATED SUBJECTS

A. Weekly Letters 40

B. Miscellaneous 59

A.

March, 1965

MASTITIS IN SHEEP

J. A. Vesely, Animal Husbandman

Mastitis in sheep is usually not detected until it is in the advanced stages. This is quite different from dairy cattle where it may be diagnosed quite early. The mortality in ewe flocks from mastitis ranges from 5 to 10%. The financial losses to sheepmen include not only the dead ewes but also undernourished and dead orphan lambs. There is also the reduced productivity of the ewes that recover. These losses do not include those that may result from ewes with hard lumps of various sizes deeply lodged in one or both halves of an udder.

Since 1961, considerable attention has been paid to all ewes with mastitis in the flock at the Manyberries Substation. Records are taken on all infected animals, date when diagnosed, type of treatment, date of death, etc. In the fall, the ewes' udders are recorded. After lambing, all ewes are given the California Mastitis Test (CMT). These records have been taken for only three years and already some important discoveries have been made.

a) In most cases, the inflammation present in CMT positive ewes clears up without treatment, although acute mastitis may occasionally develop.

b) Ewes with lumps in their udders in the fall may be CMT negative by the following spring.

c) Lumps in the udders sometimes have no bearing on the productivity of the ewes. Several ewes with lumps in their udders for the three consecutive years have not been adversely affected. Lumps in some ewes have even disappeared.

d) Ewes with acute mastitis may survive if treated early. The infected part of the udder usually stops functioning.

e) Ewes bearing twins and with only one half of the udder functioning are apt to lose one or both lambs. If one of the twins is taken away immediately after birth, such ewes often raise the heaviest lambs in the flock.

This study will continue at the Manyberries Substation in order to put more light on these findings. The heritability of susceptibility to mastitis and the effect of the lumps on longevity of the ewe will also be determined.

January, 1966

LAMB LOSSES AFFECT INCOME

J. A. Vesely, Animal Husbandman

High lamb losses are a major cause of reduced income from sheep flocks. Numerous reports have indicated that the mortality of lambs prior to weaning averages about 15 percent. Losses in some flocks are only five percent but some are up to 30 percent.

A study of lambing records at the Manyberries Substation has revealed several causes of lamb deaths, also that 12 percent of the lamb crop died prior to weaning. More than two-thirds of the lambs that died before weaning either were born dead or died within five days of birth. Almost 80 percent of all deaths occurred before the lambs were 14 days of age.

Stillbirths accounted for 25 percent of the losses. These included lambs that were born dead either prematurely or at the normal birth time. Lamb diseases caused 10 percent of the deaths, pneumonia being the main disease. This figure should probably be higher because about 40 percent of deaths were "undetermined" and many of these were most likely caused by a disease.

Failure of the ewe to claim her lamb or to have enough milk to raise her offspring accounted for about seven percent of deaths. Six percent were accidental deaths resulting from causes such as being crushed by the ewe or drowned.

Loss of lambs from coyotes and other predators was not an important factor in the Manyberries area, occurring in only one of the six years. However, such losses are highly unpredictable and could become quite serious at any time. Miscellaneous causes, such as congenital deformities, accounted for the remainder of the deaths.

It is most significant that the largest percentage of lamb deaths was from undetermined causes and occurred during the first two weeks of life. This information indicates that much more research is required. In the meantime, flock owners should make use of all the available knowledge and skills in managing their sheep, especially prior to and during the lambing season.

June, 1970

A NEW ERA IN SHEEP PRODUCTION

J. A. Vesely, Animal Geneticist (Sheep)

The sheep business has had its 'ups and downs' throughout its history in Canada. During the peak years most sheep in Western Canada were concentrated on the prairies in flocks of from one to two thousand head. Lack of qualified sheepherders, attacks by predators, high lamb mortality, and wide price fluctuations have forced many owners of these large flocks to change to beef production.

Today our sheep industry seems to be on the upswing again. While sheep have been disappearing from the ranges, small flocks are being established on many farms as a means of diversification. The present change from grain to forage crops should also accelerate this trend.

This is a 'boom' time for the sheep industry; the average price for a young breeding ewe is about $45. Many farmers are trying to get into sheep production but there is a serious shortage of breeding stock.

During the last few years several new techniques in sheep production have been developed and more are in the offing. These should revolutionize the industry and give it a new image. Confinement rearing, multiple births using hormones, artificial rearing of lambs, and out-of-season breeding are some of the advancements being investigated at various research establishments.

Sheepmen should be cautioned against over-optimism in using these new breeding and management techniques. We have recently met with several individuals who planned to start a sheep operation. They have calculated their potential returns in terms of two lamb crops in a year with at least two lambs per ewe per breeding, artificial rearing of lambs, early weaning, and shipping lambs to market at 100 days of age. It is very encouraging to see their enthusiasm and willingness to apply these new techniques. However, it is our duty to warn them that many of these advancements are still in the experimental stage and could be economically disastrous if applied too rapidly. For example, inducing estrus with hormones for out-of-season breeding is still uneconomical because two injections of PMS (pregnant mare serum) are needed per ewe. The efficiency of these drugs must be improved and their cost reduced before the sheepmen can afford to use them. Other means of improving sheep production can be applied successfully but only by experienced sheepmen with well-organized operations. An investment of $600 in a ram can be successful only if the man knows his enterprise and calculates realistically how much additional return the ram can give him.

To maintain this promising trend in the sheep industry and to reduce the number of failures, emphasis should still be placed on obtaining one 'good' lamb crop per year. Management must fit conditions; innovations must be adopted carefully to avoid a sudden disaster.

October, 1971

SHEEP CROSSBREEDING IN WESTERN CANADA

Dr. J. A. Vesely, Animal Geneticist

Crossbreeding is well recognized as a method for improving fat lamb production. In crossbreeding, the key question is: What is the best breed of dam for meat production and what is the best breed of sire for mating these ewes?

The design of sheep crossbreeding experiments throughout the world has been determined primarily by the breeds and size of flocks available. For example, in New Zealand the basic breed-of-dam has been the Romney Marsh or Corriedale, in Australia the Merino, in Great Britain the Scottish Blackface and Welsh Mountain, and in USA and Canada the range, white-faced ewe, which is predominantly Rambouillet.

At the Lethbridge Research Station a crossbreeding experiment was commenced in 1964. Its design was dictated to a great extent by the predominant breeds in western Canada. Two range breeds, Columbia and Romnelet, and two mutton breeds, Suffolk and N.C. Cheviot, were chosen.

The experiment was conducted under range conditions at our Livestock Substation at Manyberries. The ewes were confined in corrals during the five winter months and shortly after lambing were turned onto the range with their lambs. The lambs were weaned at 3 1/2 months and put on a feedlot test for 70 days.

Suffolk purebred lambs were, on the average, 7 pounds heavier at weaning than lambs of the other three pure breeds. They also gained 2 to 3 pounds more than the other breeds in the feedlot; hence their market weight was about 10 pounds higher.

The importance of breed-of-dam is considered to be the most critical feature of this study. The maternal superiority of the Suffolk over the Romnelet, Columbia, and N.C. Cheviot breeds was demonstrated by greater weaning weight (4-8 pounds), total feedlot gain (2.5-3.3 pounds), and market weight (8-10 pounds). This characteristic of the Suffolk is carried on to crossbred dams.

Those dams that had Suffolk breeding on either the dam or sire side produced three-breed lambs averaging 3 pounds heavier at weaning, 3 pounds greater feedlot gain, and were about 7 pounds heavier at market than the three-breed lambs from crossbred dams originating from Romnelet, Columbia, or N.C. Cheviot.

The influence of the dam diminished after weaning and the sire effect became more evident. Suffolk sires produced animals with the highest feedlot gains. The best specific two-breed combination was found to be Suffolk and Romnelet. These crosses out-performed the other crosses at weaning by 2-6 pounds, in feedlot gain by 1-4 pounds, and in market weight by 3-7 pounds.

The sheep industry in western Canada is now in a process of transformation. The trend is toward raising more sheep under partial or full confinement. Will the supply of the range ewes continue to be available for cross-breeding or will we use breeds such as Suffolk, Hampshire, Dorset Horn, N.C. Cheviot, or Border Leister? If the conventional extensive type of production proves to be economically desirable, then breeds like Suffolk will remain and increase.

If, on the other hand, the industry develops in the direction of more lamb crops per unit of time, then we probably will have to depend on breeds such as Rambouillet, Dorset Horn, Romanov, or Ile-de-France, which have a long breeding season, or the Finnish Landrace, which is highly prolific.

January, 1972

MEAT FLAVOR FROM MALE LAMBS

Dr. J. A. Vesely, Animal Geneticist

Ram lambs and cryptorchids are known to grow faster and have leaner carcasses than wether lambs. However, under present marketing practices, producers receive one to two dollars less per hundredweight for intact animals because of the belief that the meat has an undesirable flavor. At the Lethbridge Research Station we have demonstrated that this contention is unjustified.

We conducted a cooperative project with the Ellison Milling and Elevator Company of Lethbridge, who supplied and fed the animals, and the Lethbridge Community College, who provided facilities for conducting a taste-panel experiment.

Thirty-two ram lambs, thirty-six induced cryptorchids, and thirty-two wether lambs were weaned at an average age of 65 days and finished in a feedlot. All lambs were slaughtered when they reached a weight of 90 to 100 pounds at an average age of 126 days. Eighty-three of the carcasses graded "choice" and 17 "good".

A 3-pound cut from the right hind leg of each carcass was roasted in a separate pan at 350°F for 80 minutes. Eight roasts were prepared each day and cold samples of each were tasted the following day by eight panelists. The flavor of each roast was rated numerically from 1 to 5 depending on whether the panelist considered it to be very poor, poor, normal, good, or very good. These scores were then averaged for each of the 100 roasts. Using a standard rating scale it was determined that none of the roasts rated very poor, 2 were poor, 32 normal, 58 good, and 8 very good. Therefore, on the average, the panelists judged only 2 percent of the roasts to be below normal in flavor. There were no significant differences among the scores of the three "sex types".

These results demonstrate convincingly that meat from ram lambs or induced cryptorchids marketed at weights between 90 and 100 pounds did not have an undesirable flavor and, for this reason, a lower price for intact male lambs appears unjustified.

January, 1973

SHOULD PRODUCERS BE PAID LESS FOR RAM LAMBS?

Dr. J. A. Vesely, Animal Geneticist

Meat from ram lambs or induced cryptorchids that weighed between 90 and 100 pounds when slaughtered had no undesirable flavor. This finding is based on the results of a trial recently conducted by the Lethbridge Research Station. For this reason alone, the lower price paid for intact male lambs is unjustified. However, it is claimed frequently that ram lambs are more difficult to skin than wethers and, consequently, butchering costs are higher. This has resulted in further discrimination against ram lambs.

Recently, we conducted a second experiment, this time to test the validity of the difficult-skinning claim. Forty-one wether lambs castrated at birth and 41 ram lambs were properly finished for market. All graded "choice" except three ram lambs, which graded "good". Each group of the male sex-type consisted of animals of the same breeding. The lambs were slaughtered in a fully accredited packing plant. The time taken by the butcher to skin each whole animal, except for the hind legs and head, was measured by stop-watch and recorded. Any undue interruption in the skinning operation, as by the butcher talking or resting, was excluded by stopping the watch until work resumed. The plant officials and the workers were not aware of the timing.

The results showed a significant difference in length of time needed for skinning the two types of animal. Ram lambs needed an average of 30 seconds more time for skinning than wether lambs of comparable weight. Although the dressing percentage of ram lambs is slightly lower (approximately 1.5 percentage units) than that of wethers, the ram carcasses are leaner with less internal fat, less trimmed waste, and less percent fat in meat. Ram lambs make higher average daily gains and utilize feed more efficiently than wethers in the feedlot. There is no doubt that these qualities in ram lamb carcasses outweigh the disadvantages that often are cited. This leads us to the conclusion that there is no justification for paying the producer less for ram lambs than for wethers.

Packers may have a legitimate complaint about ram lambs if they sell whole carcasses without removing kidney fat and trimming retail cuts. It is the retailers and consumers who benefit from the advantages that ram lambs have over wethers.

Recently a new grading system for lambs has been recommended. Our results indicate that for the purpose of promoting carcasses of better quality, produced more efficiently, such as those obtained from properly raised ram lambs, a new grading system that would recognize the value of ram lambs would be warranted.

MEAT FLAVOR FROM MALE LAMBS (page 53)
and
SHOULD PRODUCERS BE PAID LESS FOR RAM LAMBS? (page 54)

References:

Scientific

Vesely, J. A. 1973. Growth rates, carcass grades, and fat composition in ram lambs, wether lambs, and induced cryptorchids. Can. J. Anim. Sci. 53: 187-192.

Vesely, J. A. 1973. Skinning time for ram and wether lambs and its implication in pricing and marketing entire males. Can. J. Anim. Sci. 53: 195-196.

Vesely, J. A. 1973. Fatty acids and steroids affecting flavor and aroma of meat from ram, cryptorchid and wether lambs. Can. J. Anim. Sci. 53: 673-678.

Vesely, J. A. and E. E. Gardiner. 1973. Urinary excretion of 11-deoxy-17-ketosteroids and their correlations with other unknown steroid compounds in ram, cryptochid and wether lambs. Can. J. Anim. Sci. 53: 679-687.

Vesely, J. A. and R. Hironaka. 1975. Feedlot performance, carcass traits, and flavor of lambs fed all-concentrate or hay and concentrate diets. Can. J. Anim. Sci. 56: 51-56.

October, 1975

SELLING LAMBS AFTER RAIN

Dr. J. A. Vesely, Animal Geneticist

When sheep producers sell lambs after a rain, the buyer frequently questions the weight of water held in the wool. No easy answer can be given to this question because many factors may influence the gain. These include duration and intensity of rain, temperature, humidity, wind, wool characteristics, and time since the rain stopped. However, we have produced a rough guide that may be used by the producer and buyer.

At the Lethbridge Research Station, we made some measurements during June and July when the high day temperature was 23-30°C and the relative humidity 48-85 percent. We used 18 Suffolk and 17 Rambouillet finished lambs in five groups. Eight of the Suffolk and five of the Rambouillet lambs were sheared. All the lambs were weighed in the morning after being isolated from feed and water overnight. Immediately after the weighing, they were sprayed with water until completely saturated, then weighed again. Three more weighings followed at 1-hour intervals with drying in an open pen between each weighing.

The Suffolk lambs produced about 2 pounds of fleece and the Rambouillets about 2.5 pounds. The lambs weighed about 100 pounds when dry. The unsheared Suffolk lambs gained about 4 percent when soaked and the sheared ones only 1 percent. For the Rambouillets, the gains were 5.5 percent and 1 percent.

After 1 hour of drying, the sheared lambs had returned to their original dry weight. The unsheared Suffolks were about 2.5 percent heavier than their dry weight and the Rambouillets 3 percent heavier. After 3 hours of drying, they were all about the same weight as that at the beginning.

The amount of weight change due to wetting and drying was confounded by other factors. However, we consider that these were of minor importance.

October, 1976

ARE FINNISH LANDRACE SHEEP USEFUL TO THE CANADIAN SHEEP PRODUCER?

Dr. J. A. Vesely, Animal Geneticist

The Finnish Landrace breed of sheep was first imported to Canada 9 years ago. However, many commercial sheepmen have been disappointed with them mainly because the rams were used indiscriminately. Performance of this breed had been studied in other parts of the world (mainly Ireland and Great Britain), but breeding plans could not be recommended in Canada because experimental work had not been conducted here. The results from Ireland and Great Britain can not be used because our climate is very different.

Several Canadian institutions acquired this new breed for research purposes. However, few official reports have been published on their findings. At the Lethbridge Research Station, we have obtained some preliminary results on the reproduction performance of half-Finnish Landrace ewes.

Last fall, at our Manyberries Substation, we selected 53 half-Dorset and 52 half-Finnish Landrace yearling ewes. The maternal sides of these groups were genetically equal so that any differences were due to the Dorset or Finnish Landrace sires. These ewes were bred to Rambouillet rams.

The half-Dorset ewes gave birth to 94 lambs and half-Finnish Landrace ewes to 120 lambs. This gives lambing rates per 100 ewes exposed to rams of 177 lambs for half-Dorset ewes and 231 lambs for half-Finnish Landrace ewes. At weaning, the corresponding rates were 166 and 206 lambs. Only 11 lambs died per 100 half-Dorset ewes exposed to rams compared with 25 lambs per 100 half-Finnish Landrace ewes.

These preliminary results show clearly that the Finnish Landrace breed has a great potential for increasing prolificacy. However, they also demonstrate that new techniques must be developed and more experience gained to raise such a large number of lambs per ewe.

The usefulness of the Finnish Landrace breed to the Canadian sheep industry cannot be viewed only from its reproductive potential. Information on other production aspects, such as growth rate, carcass quality of lambs, and longevity of ewes, must be obtained before an overall assessment can be given. We have collected data on feedlot performance and carcass quality of half-Dorset and half-Finnish Landrace lambs and expect to release the results soon.

October, 1977

MORE ABOUT FINNISH LANDRACE SHEEP

Dr. J. A. Vesely, Geneticist

Last year, we reported that the Finnish Landrace sheep has a great potential for increasing prolificacy. Our conclusion was based on the performance of 53 half-Dorset Horn and 52 half-Finnish Landrace yearling ewes.

This year, we used the same ewes as last year plus another 40 half-Dorset Horn and 45 half-Finnish Landrace yearlings of the same genetic background. Altogether, 93 half-Dorset and 97 half-Finnish one- and two-year-old ewes were used. The maternal sides of ewes in these groups were genetically equal so that any differences are due to the Dorset or Finnish sires. Equal numbers of ewes from each group were bred to Romnelet, Rambouillet, and Suffolk rams.

The half-Dorset ewes gave birth to 141 lambs and half-Finnish ewes to 231 lambs. These give lambing rates per 100 ewes exposed to rams of 152 lambs for half-Dorset ewes and 238 lambs for half-Finnish ewes--a difference of 86 percentage points. Last year, the difference between the two crosses was 54 percentage points. Thus, our assumption last year that the Finnish breed has a great potential for increasing prolificacy was supported this year very convincingly.

Growth rate and carcass quality of lambs sired by Finnish rams have concerned sheep producers. When these rams are used to produce half-Finnish breeding ewes, the half-Finnish wethers and rams must be sold as feeder or finished lambs. Such lambs, however, have satisfactory growth and carcass merit.

Work at the Lethbridge Research Station with half-Dorset and half-Finnish lambs has shown after three years that the rams of both breeds contributed about equally to weight at weaning (26.6 and 26.5 kg) and weight gain to market weight (0.241 and 0.236 kg/day). Average carcass grade was slightly better for half-Finnish lambs than for half-Dorset lambs.

Because the results are favorable for the Finnish Landrace breed, it does not imply that we urge producers to use it. They must apply their own judgement in deciding what breed of sheep to use. For example, if they want to increase prolificacy by using Finnish Landrace rams, they must have the facilities, time, know-how, and patience to raise the extra number of lambs.

June, 1978

TO VACCINATE AGAINST ENTEROTOXEMIA?

Dr. J. A. Vesely, Animal Geneticist

Enterotoxemia is one of the most dreaded diseases in sheep flocks. Mortalities have been reported up to 20% of a flock. The microorganism which causes the toxicity in the animals is a normal inhabitant of the intestines. It requires certain environmental changes for its rapid multiplication. The age and diet of susceptible animals and weather conditions apparently influence the incidence and severity of enterotoxemia in a flock.

Research has shown that vaccination is an effective preventive measure as part of a flock health program. Although the vaccine is cheap, the overall vaccination procedure, taking into consideration the cost of labor, will be costly, especially if the losses due to this disease can be avoided without vaccination. Also, a hazard is always present since this kind of vaccine, if carelessly used, can cause abscess formation in places of injection, which can devalue the carcass.

To measure the effectiveness of vaccination in our operation at the Manyberries Substation, we conducted a 3-year trial using 500 ewes. Half of them received a vaccination of 5 cubic centimeters Clostridium perfringens Type D about 1 month before lambing. Ewes in the other half did not receive the vaccine. About 90 days after the beginning of lambing, all lambs from each group of ewes were randomly subdivided into two groups. One group of lambs received 3 cubic centimeters of vaccine, the other group did not. The combinations of vaccination treatments exposed the lambs to one of the four following treatments: (1) ewe and lamb not vaccinated, (2) ewe not vaccinated, lamb vaccinated, (3) ewe vaccinated, lamb not vaccinated, (4) ewe and lamb vaccinated.

Significantly more lambs, 3.5 to 4.0%, survived to the age of 90 days from ewes that were vaccinated before lambing than from ewes that were not vaccinated. Mortality rates after the age of 90 days were small with no differences in survival rates of lambs among the four treatments.

It can be concluded that each lamb is exposed in early stages of life to many factors that affect its health. Such factors are difficult to control. Our results indicate that vaccination of ewes before lambing can be economical. But when the lamb is older, management can be used to prevent losses without vaccination.

May, 1979

ULTRASONIC MEASUREMENT OF LIVE LAMB

Dr. J. A. Vesely, Animal Geneticist

The percentage of top grades of lambs slaughtered in Canadian packing plants has increased during the last decade, but the volume of quality lamb on the market needs to be increased further. A reliable method of appraising proper finish could greatly aid the improvement of lamb quality.

We carried out a study at the Lethbridge Research Station to determine if ultrasonic measurement of backfat thickness would be useful in estimating the proper finish of live lambs.

One group of lambs was shipped to the packing plant when measurements by ultrasonics showed at least three millimeters of backfat in two of three locations over the rib eye. The measurements, taken at the twelfth rib, were located two centimeters off the central line of the back and about two centimeters apart downward. The total of the three backfat measurements provided a backfat index indicating the degree of finish.

A second group of lambs, with their finish estimated by visual appraisal, were shipped when the lambs weighed about 45 kilograms (95 pounds). All carcasses were graded by personnel of the Food Production and Marketing Branch of Agriculture Canada. The grades Canada A1, A2, A3, and A4 indicate the ascending order of degree of finish or fatness, with A1 being the ideal finish and A4 having the maximum fat rating. Canada B grade accounts for those carcasses considered "underfinished".

Lambs shipped to market on the basis of ultrasonic measurements average 1.5 kilograms lighter than lambs shipped on a weight basis. No difference in carcass grades showed up between the two groups.

Of the carcasses ultrasonically measured, 15 percent graded A1, 75 percent A2, eight percent A3, no A4 carcasses, and two percent graded B. Surprisingly, the correlation between the fat index and carcass grade was low (0.10).

We concluded that ultrasonic measurement of backfat will not provide an easy or quick technique that is superior to visual appraisal for determining the proper finish of live lambs.

April, 1980

GENETIC TYPE AFFECTS YEAR-ROUND BREEDING

Dr. J. A. Vesely, Research Scientist (Animal Breeding)

Several years ago at the Lethbridge Research Station we began investigating out-of-season breeding of sheep. We knew that to succeed in year-round breeding, the sheep must breed and conceive at reasonable rates at any time of the year. Also we knew that some breeds of sheep will breed out-of-season better than others because they have a longer breeding season. However, results from our year-round breeding trials showed that sheep with lower conception rates but high prolificacies (number of lambs born per ewe) produced more lambs than breeds that had predominantly higher conception rates but lower prolificacies.

Recently we completed an experiment on year-round breeding with Rambouillet and Suffolk ewes, obtaining six lamb crops from each breed over a 3 1/3-year period. Light treatment was applied to induce sheep to breed out-of-season. It consisted of artificially prolonged or shortened daylength to simulate spring or autumn conditions. The conception rates tended to be higher in the Rambouillet. However, the average annual lamb production from 100 ewes maintained under the light treatment was 223 in the Rambouillet and 242 in the Suffolk.

In another experiment on out-of-season breeding, half-Dorset and half-Finnish Landrace ewes were exposed to rams in May under natural daylight conditions. Only one ewe conceived and lambed. These results suggest that the genetic factor for a long breeding season in the Dorset Horn breed is not sufficiently expressed in half-Dorset females for year-round breeding under natural conditions.

Another group of half-Dorset Horn and half-Finnish Landrace ewes exposed to rams in May, but maintained under a light treatment, gave different results. About 89 percent of the half-Dorset Horn ewes and 66 percent of the half- Finnish Landarce ewes conceived and lambed. In two other in-season lamb crops, the half-Dorset ewes also exhibited higher conception rates. But, based on three lamb crops in two years, the average number of lambs produced per 100 ewes annually was 176 for the half-Dorset and 256 for the half-Finnish.

In both trials, the Suffolk ewes and the Finnish Landrace ewes produced more lambs per 100 ewes exposed to rams than the Rambouillet and Dorset Horn ewes, primarily because of their higher level of prolificacy.

January, 1981

COMPLETE CONFINEMENT OF SHEEP

Dr. J. A. Vesely, Research Scientist (Animal Breeding)

Total confinement of sheep can be a profitable enterprise for some farmers. Studies of confinement rearing at the Lethbridge Research Station show that, with proper management, confinement does not increase problems related to production or health.

Some sheep producers have questioned claims that sheep will do well under complete confinement. They believe that green grass is needed to supply many unknown nutrients necessary for normal growth and reproduction. They consider the exercise obtained by grazing to be important in preventing various physiological disorders such as "pregnancy disease". They believe that maintaining sheep in complete confinement will encourage outbreaks of contagious diseases.

Five years ago we established a flock of sheep, lambs and yearlings, at the Lethbridge Research Station to investigate confinement rearing. Since then these sheep have been maintained in three groups. Group A has been managed conventionally. Ewes bred in the fall produce lambs in March and April that are weaned during the first week of June. Ewes then go on pasture where they stay until fall. Group B has been maintained under complete confinement in open pens year-round. Group C has also been maintained under complete confinement, but at night they are kept in a barn. Involuntary culling in all three groups has been about the same. As of December 1980, 66 percent of the original ewes remained in groups A and B, and 70 percent remained in group C. These results indicate that confinement has had no detrimental effect on the wellbeing of these sheep. The annual rate of flock reduction in all groups averaged five percent. Several years ago we estimated the average annual rate of flock reduction under semi-range conditions to be 10 percent.

The losses that did occur resulted from the usual reasons - nutritional disorders, pneumonia (mostly in old sheep), rumen compaction, internal injuries and so on. Some of these losses could be further reduced by improved management. No disease problem was characteristic for any of the three management practices studied and no disease outbreaks have been experienced in any of the three groups.

Economic factors such as lambing percentage and rates of gain will be evaluated when the project is completed.

October, 1983

ROMANOV RAMS REDUCE LAMB MORTALITY

Dr. J. A. Vesely, Animal Geneticist

Recently, Agriculture Canada imported Romanov sheep, an exotic breed that originates in Russia, because of their reputation for twinning rates and hardiness. In crossbreeding trials at the Lethbridge Research Station, Romanov lambs showed much vigor immediately after birth, resulting in reduced lamb mortality.

These experiments are part of an evaluation of the Romanov, now underway, to determine what contribution, if any, this exotic breed can make to the Canadian sheep industry. Last year, the Lethbridge Research Station obtained eight Romanov rams for crossbreeding with the common breeds of sheep in western Canada. The results of these studies will help producers decide if the Romanov breed can improve their sheep operation.

The Romanov rams were exposed to 108 ewes of three different genetic types: 3/4 Finnish Landrace, 3/4 Dorset Horn, and full-blooded range ewes of Rambouillet and Romnelet breeding. For comparison, 106 ewes of the same genetic types and in the same proportions were exposed to Finnish Landrace, Dorset Horn, Rambouillet and Romnelet rams. Although results could change as the experiment progresses, the results from this first lamb crop are encouraging. For simplification, we have grouped the results into Romanov and non-Romanov matings to see what the Romanov breed has to offer.

A striking characteristic of the Romanov breed was evident at lambing time. The Romanov lambs exhibited strong vigor immediately after birth by getting up on their feet and nursing without assistance. Their vigor was later confirmed by the mortality rates of the lambs from birth to weaning. The mortality of Romanov lambs averaged five percent; for the non-Romanov lambs it averaged 13 percent. Weaning weights were similar, 15.8 kilograms versus 15.4 kilograms, and feedlot daily gains, 0.28 kilograms, were the same for both groups. On average, each ewe raising half-Romanov lambs produced 6 kilograms more finished lamb than those raising non-Romanov lambs (89 kilograms versus 83 kilograms). This difference was primarily due to the different lamb mortality rates.

Our previous research showed that the Finnish-Landrace breed of sheep, imported 20 years ago, made its unique contribution only when used in special breeding programs. The Romanov breed may prove to have a similar kind of usefulness.

February, 1984

FEEDING MONENSIN TO FEEDLOT LAMBS

Dr. K.-J. Cheng, Rumen Microbiologist
and
Dr. J. A. Vesely, Animal Breeder

In experiments at the Lethbridge Research Station, the antibiotic monensin (Rumensin) improved feed efficiency when lambs had an infestation of coccidia. In general, feeding monensin to beef cattle and lambs has increased feed efficiency by about 10%. Some researchers have reported increased rates of weight gain as well, while others have seen no increase. The increase in feed efficiency from monensin has been attributed by these researchers to changes in rumen fermentation by increasing propionic acid production, decreasing methane production, and decreasing protein degradation.

Results from four experiments at the Lethbridge Research Station confirm feed efficiency increases of 5 to 12% when monensin was fed to naturally reared lambs. Our work suggests that monensin increases feed efficiency mainly because it controls coccidial infestations in the digestive tract.

In our experiments, monensin-fed lambs showed minor changes in propionic acid production. The monensin-fed, coccidia-free lambs raised in isolation had the largest increase in propionic acid production but these lambs showed no increase in feed efficiency. A decrease in the methane ratio of digestive gasses in the rumen also was noted in our studies of monensin-fed, naturally reared lambs but the total production of methane was similar to that in untreated animals. Although we detected slightly higher levels of protein in the rumen fluid, we saw no significant decrease in protein degradation by microbial activity to support the suggestion that monensin increased feed efficiency by sparing protein from microbial digestion in the rumen.

However, monensin had a dramatic effect on coccidial populations in the digestive tract. Monensin cleared this parasitic protozoan from all infested animals and these same animals showed increased feed efficiency. In contrast, monensin feeding did not increase feed efficiency of coccidia-free lambs raised in isolation. Coccidial infestation tends to decrease with age in lambs. Consequently, feed efficiency from monensin is not constant from experiment to experiment.

We suggest, therefore, that the increase in feed efficiency of lambs fed monensin is attributable primarily to the control of coccidial infestation and that monensin feeding will be most effective in improving feed effeciency when lambs are infested with coccidia.

August, 1984

GOOD MANAGEMENT KEEPS LAMBS HEALTHY

Dr. J. A. Vesely, Animal Geneticist

Recent studies at the Lethbridge Research Station have shown that a "cocktail" of beneficial bacteria fed to newborn lambs under laboratory conditions improves their growth rate and protects them from disease. However, other studies at Lethbridge have shown that lambs raised in a clean, dry barn environment obtain their own beneficial bacterial "cocktail" naturally and thus acquire resistance to organisms that cause digestive upsets.

In the first experiment, newborn lambs were put immediately into disinfected laboratory environment. Half of them received a mixture of "good" bacteria in a small sample of milk. When all lambs were subjected to digestive stress by giving them diarrhea-causing bacteria, those lambs that received the bacterial cocktail showed no discomfort but several of the lambs not receiving the cocktail developed scours. Lambs receiving the bacterial cocktail had superior growth rates until they reached market weight.

To test the practicality of the bacterial cocktail, an experiment was conducted under barn conditions. Ewes and their lambs from four lamb crops were randomly divided into two groups. In the first group, ewes and their lambs, regardless of how many were born, were kept together and the lambs raised conventionally. In the second group, each lamb received the bacterial cocktail. Ewes giving birth to triplets and quadruplets had their litter size reduced to two lambs, and the surplus lambs were raised artificially. The average mortality rate of lambs from birth to weaning for the four lamb crops was 12 percent in the first and 6 percent in the second group. The lower mortality in the second group can primarily be attributed to the surplus lambs being raised artificially. A substantial number of lambs in the first group died of starvation when raised as triplets or quadruplets. The weaning weights of surviving lambs were similar for both groups. Thus, these results showed that under barn conditions the feeding of the bacterial cocktail was not advantageous.

On the basis of these experiments, we can conclude that a bacterial cocktail may save some lambs and improve growth under conditions of stress and poor hygiene. Lambs born in clean, dry pens will contract the desirable bacteria naturally and will acquire resistance to the bacteria that cause digestive upsets.

May, 1985

WOOL OF ROMANOV SHEEP

Dr. J. A. Vesely, Animal Geneticist
Lethbridge Research Station

and

G. A. Brooks
Canadian Co-operative Wool Growers Ltd.

The Romanov is the latest sheep breed to be imported into Canada. One of its least desirable traits is its fleece. Romanov fleece consists of two kinds of fibres: One is long, black and very coarse (hairy); the other is short, grey and fine. There is no market for Romanov wool in Canada at present. Producers will have to store it in warehouses until a sufficient quantity has been accumulated for sale to the United Kingdom.

The Lethbridge Research Station is cooperating with Canadian Cooperative Wool Growers Ltd. in a study to determine the quality of wool from crossbred Romanov sheep as compared to that of other breeds. Wool samples were collected from 180 ewe lambs (the first lamb crop of a crossbreeding experiment with Romanov rams and Dorset, Finn and Western ewes). Wool from Romanov crossbreds was found to be marketable, although it is significantly coarser than that from native breeds.

Western (Rambouillet, Romnelet) and Dorset ewe lambs had average spinning counts of 56 (between fine and 1/2 staple), whereas crossbred ewe lambs (from Romanov rams and Dorset, Finn or Western ewes) had average spinning counts of 47 (ranging about 1/4 staple).

Defective fibres (kempy) were found in high frequencies on the breech in Romanov x Dorset and Romanov x Finn crosses.

Colored fleece was obtained in very low frequency from crosses between Romanov and Finn breeds. Color of the wool samples did not appear to be of significant importance because they originated from small areas only. Thus, they did not represent a true measure of colored fibre present in the whole fleece. However, among the 568 Romanov-cross lambs, about 40% had colored spots, while 468 non-Romanov lambs had none. Even a small amount of colored fibre in a fleece is undesirable because such fleeces cannot be used to produce white or pastel-colored yarns.

The Romanov breed has several outstanding characteristics that could be exploited in crossbreeding systems. These are high prolificacy (more than two lambs born per ewe per lambing), ability to breed year-round, hardiness (high lamb survival) and early maturity. Experiments to measure performance of these and other traits have been in progress at Lethbridge Research Station for the past two years. In the final evaluation, the contribution of the desirable traits will have to be weighed against the negative traits such as wool quality.

B.

HERITABILITIES AND GENETIC CORRELATIONS IN MORPHOLOGIC CHARACTERISTICS OF BABY TEETH IN RAMBOUILLET AND ROMNELET SHEEP

Abstract

Data were used from 1009 Rambouillet and 1104 Romnelet lambs representing 40 sires of each breed. Traits studied were: width of the two central incisors measured at the bottom and top of each tooth; length of the three pairs of central incisors; angle of the central incisors with the upper jaw; and distance between the two canines at the base. Least-squares analyses estimated effects of year, age of dam, sex, type of rearing, sires, and regression of trait on age of lamb. Estimates of genetic parameters were obtained for each breed from paternal half-sib analysis. Heritabilities for width of the two central incisors averaged 0.58, of the next adjacent pair, 0.51, and of the third pair (from the center) 0.41. Heritability estimates for the angle of the front teeth with the upper gum averaged 0.34 and the distance between the two canines, 0.38. Most of the genetic correlations between width of the central incisors and the other measurements were positive.

Reference:

Scientific

Vesely, J. A. 1972. Heritabilities and genetic correlations in morphologic characteristics of baby teeth in Rambouillet and Romnelet sheep. Can. J. Anim. Sci. 52: 273-281.